REMARKS

STATUS OF THE CLAIMS

1. (Original) A method for synthesizing carbon nanostructures, the method comprising:

providing a catalyst of metal nanoparticles;

entraining the catalyst in an inert gas; and

exposing the entrained catalyst to a carbon precursor gas at a temperature sufficient to form carbon nanostructures.

2. (Original) The method of claim 1, wherein the catalyst is a metal selected from the group consisting of iron, nickel, molybdenum and cobalt, or mixtures thereof.

3. (Original) The method of claim 2, wherein the metal is iron.

4. (Original) The method of claim 2, wherein the metal is molybdenum.

5. (Original) The method of claim 1, wherein the catalyst has a particle size between 3 nm to 7nm or about 5 nm to 10 nm.

6. (Original) The method of claim 1, wherein the catalyst is supported on a powdered oxide substrate.

7. (Original) The method of claim 6, wherein the powdered oxide substrate is selected from the group consisting of Al_2O_3, SiO_3, MgO and zeolites.

8. (Original) The method of claim 7, wherein the powdered oxide substrate is Al_2O_3.

9. (Original) The method of claim 7, wherein the powdered oxide substrate has a particle size of 0.5 μm to 5 μm.

10. (Original) The method of claim 1, wherein the inert gas is selected from the group consisting of argon, helium, nitrogen, or hydrogen.

11. (Original) The method of claim 10, wherein the inert gas is argon.

12. (Original) The method of claim 1, wherein the carbon precursor gas is selected from the group consisting of methane, ethane, propane, ethylene, propylene, and carbon dioxide.

13. (Original) The method of claim 12, wherein the carbon precursor gas is methane.

14. (Original) The method of claim 1, further comprising another gas.

15. (Original) The method of claim 14, wherein the other gas is selected from the group consisting of hydrogen, helium, argon, neon, krypton and xenon or a mixture thereof.

16. (Original) The method of claim 15, wherein the other gas is a mixture of hydrogen and argon.

17. (Original) The method of claim 1, wherein the temperature is less than 1000 °C.

18. (Original) The method of claim 17, wherein the temperature is about 800 °C to 1000 °C.

19. (Original) The method of claim 1, wherein the carbon nanostructure is single-walled carbon nanotubes.

20. (Withdrawn) A system for continuous production of carbon nanostructures, the system comprising:

a particle injector for entraining a catalyst in an inert gas flow;

a pre-heater for heating the gas flow of entrained catalyst; and

a reaction chamber wherein the reaction chamber comprises an inlet for the gas flow of entrained catalyst, an inlet for flow of reactant gases, and inlet for creating a helical flow of gases within the reaction chamber.

21. (Withdrawn) The system of claim 20, further comprising collection vessels for collecting the nanostructures.

22. (Withdrawn) The system of claim 21, wherein the catalyst is a metal selected from the group consisting of iron, nickel, molybdenum and cobalt, or mixtures thereof.

23. (Withdrawn) The system of claim 22, wherein the metal is iron.

24. (Withdrawn) The system of claim 22, wherein the metal is molybdenum.

25. (Withdrawn) The system of claim 20, wherein the catalyst is supported on a powdered oxide substrate.

26. (Withdrawn) The system of claim 25, wherein the powdered oxide substrate is selected from the group consisting of Al_2O_3, SiO_3, MgO and zeolites.

27. (Withdrawn) The system of claim 26, wherein the powdered oxide substrate is Al_2O_3.

28. The system of claim 26, wherein the powdered oxide substrate has a particle size of 0.5 μm to 5 μm, and the catalyst has a particle size between 1 nm to 10 nm.

29. (Withdrawn) The system of claim 20, wherein the inert gas is selected from the group consisting of argon, helium, nitrogen, or hydrogen.

30. (Withdrawn) The system of claim 29, wherein the inert gas is argon.

31. (Withdrawn) The system of claim 20, wherein the reactant gas is selected from the group consisting of methane, ethane, propane, ethylene, propylene, and carbon dioxide.

32. (Withdrawn) The system of claim 31, wherein the reactant gas is methane.

33. (Withdrawn) The system of claim 32, further comprising another gas selected from the group consisting of hydrogen, helium, argon, neon, krypton and xenon or a mixture thereof.

34. (Withdrawn) The system of claim 33, wherein the other gas is a mixture of hydrogen and argon.

35. (Withdrawn) The system of claim 20, wherein the temperature is less than 1000 °C.

36. (Withdrawn) The system of claim 35, wherein the temperature is about 800 °C to 1000 °C.

37. (Withdrawn) The system of claim 20, wherein the carbon nanostructure is single-walled carbon nanotubes.

38. (Original) A carbon nanotube structure produced by the process of :

entraining a catalyst in an inert gas, wherein the catalyst is a metal supported on a powdered oxide substrate, wherein the metal is selected from the group consisting of iron, nickel, molybdenum and cobalt, or mixtures thereof, and the powdered oxide substrate selected from the group consisting of Al_2O_3, SiO_3, MgO and zeolites;

exposing the entrained catalyst to a precursor gas at a temperature sufficient to form carbon nanotube structure; and

collecting the synthesized carbon nanostructures.

39. (Original) The process of claim 38, wherein the metal is iron.

40. (Original) The process of claim 38, wherein the metal is molybdenum.

41. (Original) The process of claim 38, wherein the powdered oxide substrate is Al_2O_3.

42. (Original) The process of claim 38, wherein the powdered oxide substrate has a particle size of 0.5 μm to 5 μm, and the metal has a particle size between 3 nm to 10 nm.

43. (Original) The process of claim 38, wherein the inert gas is selected from the group consisting of argon, helium, nitrogen, or hydrogen.

44. (Original) The process of claim 43, wherein the inert gas is argon.

45. (Original) The process of claim 38, wherein the reactant gas is selected from the group consisting of methane, ethane, propane, ethylene, propylene, and carbon dioxide.

46. (Original) The process of claim 45, wherein the reactant gas is methane.

47. (Original) The process of claim 45, further comprising another gas selected from the group consisting of hydrogen, helium, argon, neon, krypton and xenon or a mixture thereof.

48. (Original) The process of claim 47, wherein the other gas is a mixture of hydrogen and argon.

49. (Original) The process of claim 38, wherein the temperature is less than 1000 °C.

50. (Original) The process of claim 38, wherein the carbon nanostructure is single-walled carbon nanotubes.

RESPONSE TO RESTRICTION REQUIREMENT

In the Office Action, the Examiner restricted the claims to two groups. The Examiner therein required election of one of the following groups of claims:

Group I, claims 1-19 and 38-50, drawn to a method for synthesizing carbon nanostructures (classified in class 423, subclass 447.3);

Group II, claims 20-37, drawn to a system for continuous production of carbon nanostructures (classified in class 422, subclass 212).

Applicants provisionally elect Group I comprising claims 1-19 and 38-50, drawn to a method for synthesizing carbon nanostructures, without traverse.

CONCLUSION

Consideration of the claims is respectfully requested, and a notice of allowance is earnestly solicited. If the Examiner has any questions concerning this Preliminary Amendment, the Examiner is invited to telephone Applicants' representative at (650) 335-7818.

Respectfully submitted,
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